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New Records of Fishes from the Hawaiian Islands[1]

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ABSTRACT: The following fishes represent new records for the Hawaiian Islands: the moray eel *Lycodontis javanicus* (Bleeker), the frogfish *Antennarius nummifer* (Cuvier), the jack *Carangoides ferdau* (Forsskål), the grouper *Cromileptes altivelis* (Cuvier) (probably an aquarium release), the chubs *Kyphosus cinerascens* (Forsskål) and *K. vaigiensis* (Quoy and Gaimard), the armorhead *Pentaceros richardsoni* Smith, the goatfish *Upeneus vittatus* (Forsskål) (a probable unintentional introduction by the Division of Fish and Game, State of Hawaii), the wrasse *Halichoeres marginatus* Rüppell, the gobies *Nemateleotris magnifica* Fowler and *Discordipinna griessingeri* Hoese and Fourmanoir, the angelfish *Centropyge multicolor* Randall and Wass, the surgeonfish *Acanthurus lineatus* (Linnaeus), the oceanic cutlassfish *Assurger anzac* (Alexander), and the driftfish *Hyperoglyphe japonica* (Döderlein). In addition, the snapper *Pristipomoides auricilla* (Jordan, Evermann, and Tanaka) and the wrasse *Thalassoma quinquevittatum* (Lay and Bennett), both overlooked in recent compilations, are shown to be valid species for the Hawaiian region. Following Parin (1967), the needlefish *Tylosurus appendiculatus* (Klunzinger), which has a ventral bladelike bony projection from the end of the lower jaw, is regarded as a morphological variant of *T. acus* (Lacepède).

IN 1960, W. A. Gosline and V. E. Brock achieved the difficult task of bringing the fish fauna of the Hawaiian Islands into one compact volume, their *Handbook of Hawaiian Fishes*. They listed 584 native species. Strasburg (1966) reported three new records of fishes from the Islands: *Hime japonicus* (Günther), actually a new species which Paul Struhsaker intends to describe in the genus *Aulopus* Cloquet; *Pikea maculata* Döderlein and Steindachner (= *Liopropoma maculatum*); and *Omobranchus elongatus* (Peters), a misidentification of *Omobranchus rotundiceps obliquus* (Garman) (Springer and Gomon 1975). Strasburg pointed out that about one new Hawaiian fish (meaning both new species and new record) has been recorded each year since the appearance of the *Handbook*. He listed Gosline (1960), Randall (1961, 1963), and Strasburg (1960) for earlier records. Randall (1961) has since been modified by Randall and Caldwell (1970).

Randall (1976) reviewed the additions to, and alterations in, the nomenclature of the Hawaiian fish fauna to 1975. Papers are cited that add 25 species of fishes to the Hawaiian fauna as new species, new records, or species overlooked by Gosline and Brock or regarded erroneously as junior synonyms. Randall (1976) does not mention the first record of the muraenid eel *Lycodontis javanicus* (Bleeker) from the Hawaiian Islands cited by Brock (1972) in his M.S. thesis, because the author believed that this would be published by Brock. Since it has not been, this record is given here (though still attributed to Brock). Brock had two Hawaiian specimens. One is BPBM 13318, 143 mm total length, collected off Waikiki, Oahu, by W. A. Gosline and ichthyology class on 27 September 1962. The other, 2160 mm total length and weighing 29 kg, was not retained (though it is illustrated in Brock 1972). The Bernice P. Bishop Museum received another specimen (BPBM 22767, 2053 mm total length, 31.3 kg), a male, which was caught by hook and line by Royden Suzuki off

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Milolii, Kona coast of Hawaii, in late October 1977.

There have been many new records of fishes from Hawaii since preparation of the review by Randall (1976). Iwamoto (1975) recorded the first slickhead, *Alepocephalus blanfordii* Alcock, from Hawaii; two specimens were taken in 2000 m. Randall (1975*b*) described a new angelfish, *Genicanthus personatus*, as endemic to the Hawaiian Islands. Randall (1975*a*) recorded *Pseudomonacanthus garretti* (Fowler) from the islands (now classified in *Thamnaconus* Smith, following Hutchins 1977). Katayama (1975) described the serranid *Caprodon unicolor* from Midway. McCosker (1975) recorded the very attenuate snake eel *Phaenomonas cooperae* Palmer from Hawaii. Eschmeyer and Randall (1975) described two new scorpaenid fishes and added four new records of this family to the Hawaiian fauna. Gomon and Randall (1975, 1978) named the labrid fish *Bodianus russelli* from specimens from Hawaii and the Ryukyus [Gomon (1977) placed it in the new genus *Polylepion*]. Iwamoto, McCosker, and Barton (1976) recorded the midwater alepocephalid fish *Herwigia kreffti* from Hawaii, a species previously known only from the Atlantic. Robins and Robins (1976) reported the synaphobranchid eels *Dysommina rugosa* Ginsburg and *Meadia abyssalis* (Kamohara) from deep water in the Hawaiian Islands. Two other synaphobranchids of the genus *Dysomma* that represent new records for Hawaii are under study by David G. Smith of the Marine Biomedical Institute of the University of Texas at Galveston and P.H.J. Castle of the Victoria University of Wellington in New Zealand. Randall and Kotthaus (1977) described the labrid fish *Suezichthys tripunctatus* from the Hawaiian Islands and East Africa. Davis, Randall, and French (1977) recorded the goby *Ptereleotris heteropterus* (Bleeker) from Hawaii. Heemstra and Randall (1977) named two new *Emmelichthys* from Hawaiian waters and other localities. Allen and Randall (1977) revised the Indo-Pacific sharpnose puffers (*Canthigaster*). They described *C. inframacula* as new from relatively deep water off Oahu, resurrected *C. epilampra* (Jenkins) (type locality, Hawaiian Islands) from synonymy, and listed *C. solandri* from Hawaii [earlier record omitted by Gosline and Brock (1960)]. Randall, Matsuura, and Zama (1978) showed that Gosline and Brock (1960) were in error in listing the triggerfish *Xanthichthys ringens* (Linnaeus) from the Hawaiian region, as this species is restricted to the Atlantic. However, two other species of the genus occur in the islands: *X. auromarginatus* (Bennett) and *X. mento* (Jordan and Gilbert) (the one Gosline and Brock confused with *X. ringens*). Randall (1979) described two new *Anthias* from Hawaii and recorded the anthiine genus *Luzonichthys* Herre from postlarval specimens of an unidentified species. Lobel (1979) described the gobiid fish *Trimma taylori* from the Hawaiian Islands. Randall (1980) named two new anthiine fishes of the genus *Plectranthias* Bleeker from Hawaii and recorded another species of this genus for the first time. In their revision of Indo-Pacific serranid fishes of the genus *Liopropoma*, Randall and Taylor (unpublished paper) will describe a new species from the Hawaiian Islands.

Taylor (1977) wrote a popular article on a spectacular 15-ft shark caught off Oahu in 500 ft of water. This specimen represents a new family, new genus, and new species, and is deposited in the Bernice P. Bishop Museum (BPBM 22730). A scientific paper describing it is in preparation. Tinker (1978) used a photograph of this shark for the frontispiece of his *Fishes of Hawaii* and discussed it in the Appendix.

Gosline and Brock (1960) recorded one species of the holocentrid genus *Ostichthys* from Hawaii, *O. japonicus* (Cuvier). Randall, Shimizu, and Yamakawa (unpublished paper) have shown that this species is not known from Hawaiian waters. But two others are: *O. archiepiscopus* (Valenciennes) and an undescribed species. The single species of the genus listed by Tinker (1978), *O. pillwaxii* Steindachner, is a junior synonym of *O. archiepiscopus*. His illustration, however, is *oligolepis* Whitley, the type species of a new genus to be named by Randall, Shimizu, and Yamakawa. The species *oligolepis* has most often been misidentified as *O. pillwaxii* or *O. japonicus*.

Tinker's book is also commendable in bringing together in one volume the entire Hawaiian fish fauna. It is profusely illustrated, and many of the figures are Tinker's own photographs. There are some errors, as one would expect of any book attempting to include all the species of a major group of animals from an area like the Hawaiian Islands, particularly when the definitive classification of that group is far from attained. Some species are included as occurring in Hawaii when in reality they are not found in the islands. For example, of eight species of groupers of the genus *Epinephelus* and two of *Cephalopholis* listed by Tinker, seven of which are indicated as introductions, only two are now known to occur: the endemic deep-water *E. quernus* Seale and the introduced *C. argus* Bloch and Schneider. A third, *E. tauvina* (Forsskål), is a misidentification of a very rare species that is found in Hawaiian waters which reaches enormous size [the lack of specimens precludes indentification, but it may possibly be *E. lanceolatus* (Bloch)].

Another group for which the presentation in both Gosline and Brock (1960) and Tinker (1978) will require some alteration is the parrotfish genus *Scarus*. Randall and Choat (unpublished paper) have shown that there are five species of this genus in Hawaiian waters: *S. rubroviolaceus* Bleeker (*S. paluca* Jenkins and *Pseudoscarus jordani* Jenkins are junior synonyms), *S. dubius* Bennett (*S. formosus* Valenciennes and *S. lauia* Jordan and Evermann are junior synonyms, the last based on the terminal male phase), *S. psittacus* Forsskål (*S. forsteri* Valenciennes is a junior synonym), *S. sordidus* Forsskål, and *S. perspicillatus* Steindachner.

A number of new records of fishes have resulted from exploratory trawling for shrimps in relatively deep water in the Hawaiian Islands by the National Marine Fisheries Service. The fishes taken during this survey were the principal basis for the Ph.D. Thesis of Struhsaker (1973), who plans to publish the new records. Some, however, have been preempted by Tinker (1978).

In recent years, midwater trawls in the Hawaiian area have yielded new records and new species of mesopelagic fishes. The systematic studies of these collections is not complete, so it is premature at this time to attempt a listing of the species new to Hawaiian waters (Thomas A. Clarke, personal communication). Significant systematic and ecological papers concerning these collections are those of Clarke (1973, 1974), Hartmann and Clarke (1975), Clarke and Wagner (1976), Wisner (1976), Clarke (1978), and Kawaguchi and Shimizu (1978).

In addition to the 15 new records of fishes to Hawaii presented herein, discussions are given for three fishes not recognized or omitted by Gosline and Brock (1960). Specimens have been deposited in the Bernice P. Bishop Museum, Honolulu. The length used in recording the size of the specimens is standard length (SL), which is the horizontal distance from the front of the snout to the base of the caudal fin (hence end of vertebral column). An exception is the measurement of the jack *Carangoides ferdau*, for which fork length (FL) is used; this is the horizontal distance from the front of the snout to the end of the median caudal rays. Spine and soft ray counts of the dorsal and anal fins are differentiated by using roman numerals for spines and arabic numerals for soft rays. Lateral-line scale counts were made from the upper end of the gill opening to the base of the caudal fin. In recording gill-raker counts, the number on the upper limb is given first, followed by that for the lower limb; the raker at the angle is included in the count of the lower limb. All rudiments were counted. The species are presented in approximate phylogenetic sequence. All illustrations are of Hawaiian specimens.

ANTENNARIIDAE (FROGFISHES)

Antennarius nummifer

Figure 1

Chironectes nummifer Cuvier, 1817. Mém. Mus. Hist. Nat. Paris, vol. 3, p. 430, pl. 17, fig. 4 (no locality); Valenciennes in Cuvier and Valenciennes, 1837. Hist. Poiss., vol. 12, p. 425 (coast of Malabar).

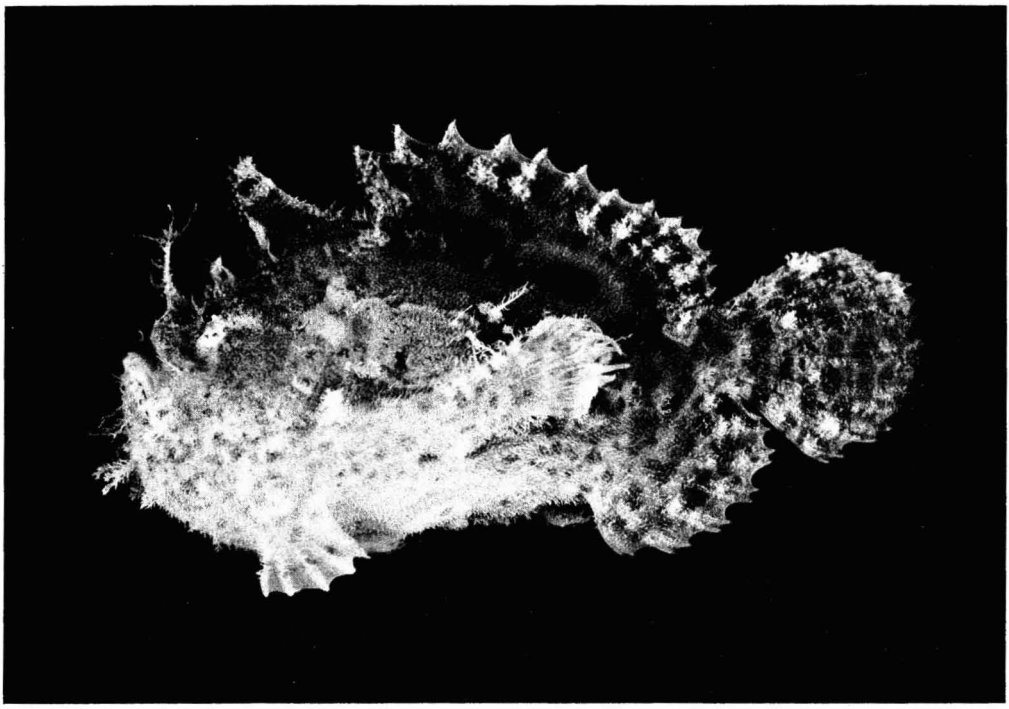

FIGURE 1. *Antennarius nummifer*, 25 mm SL, BPBM 9851.

In July 1970, the author and Paul M. Allen collected a single small specimen of an unfamiliar frogfish of the genus *Antennarius* with rotenone from a cave in 37.5 m off Lahilahi Point, Waianae coast, Oahu. Allen collected a second larger specimen in 24.5 m off the Waianae coast the following September. These specimens (BPBM 9851, 25 mm SL; BPBM 10952, 43 mm SL) could not be identified as any of the seven antennariids recorded from the Hawaiian Islands by Gosline and Brock (1960). Using a revision of the family by Schultz (1957), they key to *Antennarius nummifer* (Cuvier). This identification was confirmed by Theodore W. Pietsch of the University of Washington, who is monographing the group again.

The diagnostic characters for this species, all of which are exhibited by these two specimens, are as follows: soft dorsal rays 12, the last two branched; anal rays 7, all branched; pectoral rays 10, all simple; pelvic rays 5, the last branched; first dorsal spine (the ilicium) about equal in length to the second spine, the tip of the ilicium more or less bilobed, one lobe fleshy and the other with 12 small slender tentacles; a mid-dorsal naked area between the bases of the second and third dorsal spines; rear base of soft dorsal and anal fins ending distinctly anterior to base of caudal fin. In alcohol the specimens are pale, mottled, and blotched with brown, with a nearly circular dark-brown spot on the back and basal portion of the soft dorsal fin between the seventh and tenth rays (small specimen) or eighth to eleventh rays (larger specimen), this spot broadly surrounded by a pale zone.

The small specimen survived the rotenone for a few hours. When first collected it was primarily yellowish, but later the color became mottled reddish except for the lower head, thorax, and abdomen, which remained yellowish; the fleshy part of the tips of the ilicium was bright yellow; numerous tiny-branched cutaneous appendages on the head, body, and fins varied in color from yellowish to pure white.

BELONIDAE (NEEDLEFISHES)

Tylosurus acus

Figure 2

Sphyraena acus Lacepède, 1803. Hist. Nat. Poiss., vol. 5, p. 59 (type locality, West Indies).

Gosline and Brock (1960) overlooked the record of this needlefish from the Hawaiian Islands first made by Jordan, Evermann, and Tanaka (1927) as *Thalassosteus appendiculatus* (Klunzinger). [These authors erroneously attributed the authorship of *appendiculatus* to Günther, as pointed out by Mees (1962) in his preliminary revision of the Belonidae. Mees placed the species *appendiculatus* in the genus *Belone*.] Tinker (1978) included it as *Strongylura appendiculata* in his *Fishes of Hawaii*. The author obtained a specimen in February 1970 from a fish market in Honolulu (BPBM 10017, 830 mm SL, 1.2 kg), which is illustrated herein. Apart from the bladelike bony keel extending ventrally from the tip of the lower jaw, this fish has all the characteristics of *Tylosurus acus*; Parin (1967) placed it in the synonymy of *T. acus melanotus* (Bleeker). Bruce B. Collette (personal communication) commented that the bony ventral projection from the end of the lower jaw occurs only on adults and has not yet been found on any Atlantic specimens of the species.

FIGURE 2. *Tylosurus acus*, 830 mm SL, 1.2 kg, BPBM 10017.

CARANGIDAE (JACKS)

Carangoides ferdau

Figure 3

Scomber ferdau Forsskål, 1775. Descr. Animal., p. 55 (type locality, Jeddah, Red Sea).

William F. Smith-Vaniz of the Academy of Natural Sciences of Philadelphia has informed the author that the species most recent authors, including Gosline and Brock (1960), have identified as *Carangoides ferdau* is *C. orthogrammus* (Jordan and Gilbert). The true *C. ferdau* is a barred fish here

FIGURE 3. *Carangoides ferdau*, 373 mm FL, 0.8 kg, BPBM 20877.

reported from Hawaii for the first time. It is the same as the one from the Marshall Islands identified as *C. gilberti* (Jordan and Seale) by Woods in Schultz and collaborators (1953).

In July–August 1977, Henry Okamoto of the Division of Fish and Game, State of Hawaii, speared three specimens of *Carangoides ferdau* at French Frigate Shoals, Laysan, and Lisiansky in the leeward Hawaiian Islands. These specimens, 265–375 mm FL, are now deposited in the Bernice P. Bishop Museum (BPBM 20877). They are readily identified as *ferdau* by the following characters: villiform teeth in bands in jaws, on vomer, palatines, and tongue (none enlarged as canines); median prepelvic region of thorax naked; anterior part of soft dorsal and anal fins elevated; dorsal rays VII-I,33 or 34 (posterior spines of spinous dorsal partially buried in the two larger specimens); anal rays II(buried)-I,26 or 27; pectoral rays 22–24; scutes 28 or 29; gill rakers 8–10 + 19; color silvery with nine dark bars about as wide as pale interspaces on body, the first two on nape, the last on caudal peduncle (bars extend about two-thirds distance to ventral part of body; they are usually at least partially faded on preserved specimens); posterior edge of caudal fin blackish.

This jack has a broad distribution in the Indo-Pacific region from the Red Sea and East Africa to French Polynesia. Although it may be observed as solitary individuals, it often swims in small schools [as shown in the plate on p. 46 of Bagnis et al. (1972), where it is misidentified as *Gnathanodon speciosus*].

SERRANIDAE (GROUPERS)

Cromileptes altivelis

Figure 4

Serranus altivelis Cuvier in Cuvier and

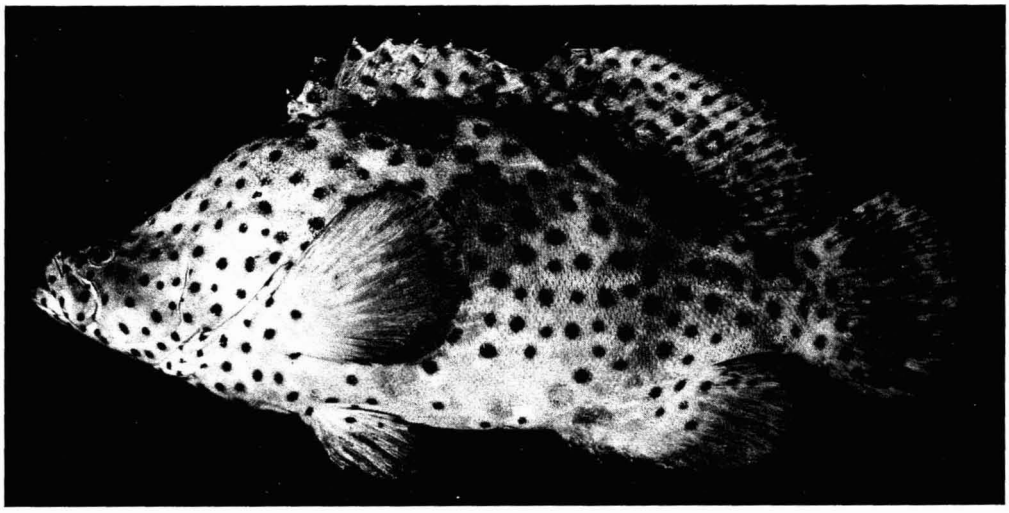

FIGURE 4. *Cromileptes altivelis*, 425 mm SL, 3.05 kg, BPBM 21101.

Valenciennes, 1828. Hist. Nat. Poiss., vol. 2, p. 324, pl. 35 (type locality, Java).

On 29 March 1978, a specimen of the distinctive serranid fish *Cromileptes altivelis* was speared by Lloyd K. Miyashiro in 18 m off Barber's Point, Oahu. He brought the fish to Tamashiro Market. An excited telephone call from the market about a new species of grouper resulted in the author making a trip to examine the specimen, which was kindly donated to the Bernice P. Bishop Museum.

This grouper (BPBM 21101, 425 mm SL) is typical of the species. It has the very small head with concave dorsal profile, high compressed body (depth 2.5 in SL; width 2.1 in depth), no enlarged teeth in the jaws, a slitlike posterior nostril, and the following meristic data: dorsal rays X,18; anal rays III,10; pectoral rays 18; gill rakers 8 + 16. When fresh, it was pale greenish gray with numerous black spots of variable size on the head, body, and fins, a black saddlelike spot dorsally on the caudal peduncle, and large indistinct roundish dark blotches on the body. The specimen is unusual in having the pectoral fins largely unspotted (there are only one or two black spots at the base and small ones near the distal edge of the fins).

Upon hearing of this record, Kathryn Christine Miller of the Waikiki Aquarium reported to the author that she had observed one individual of this grouper 10–12 inches long in about 50 ft of water on the Kona coast of the island of Hawaii just north of Honokahau in July, 1977.

The single Bishop Museum specimen of *C. altivelis* and the one sight record are more likely the result of aquarium releases than natural colonization of Hawaii by this species. This grouper is a popular aquarium fish when it is a juvenile (the black spots are fewer in number and relatively larger on juveniles). It has various common names, depending in part on the locality from whence it is collected: polkadot grouper, leopard grouper, panther fish, humpback rock cod, and barramundi cod. It is exported from the Philippines to Hawaii and the mainland United States. In an aquarium it grows rapidly and may soon pose a threat to other residents of the tank, at which time an aquarist may be tempted to release it to the sea.

The normal distribution of *C. altivelis* is the western Pacific from southern Japan to south Queensland, through Indonesia to India. It is not reported from islands of Oceania except Palau (Helfman and Randall 1973) (BPBM 9511, 2: 264–350 mm SL). Masuda, Araga, and Yoshino (1975) recorded the species to 600 mm.

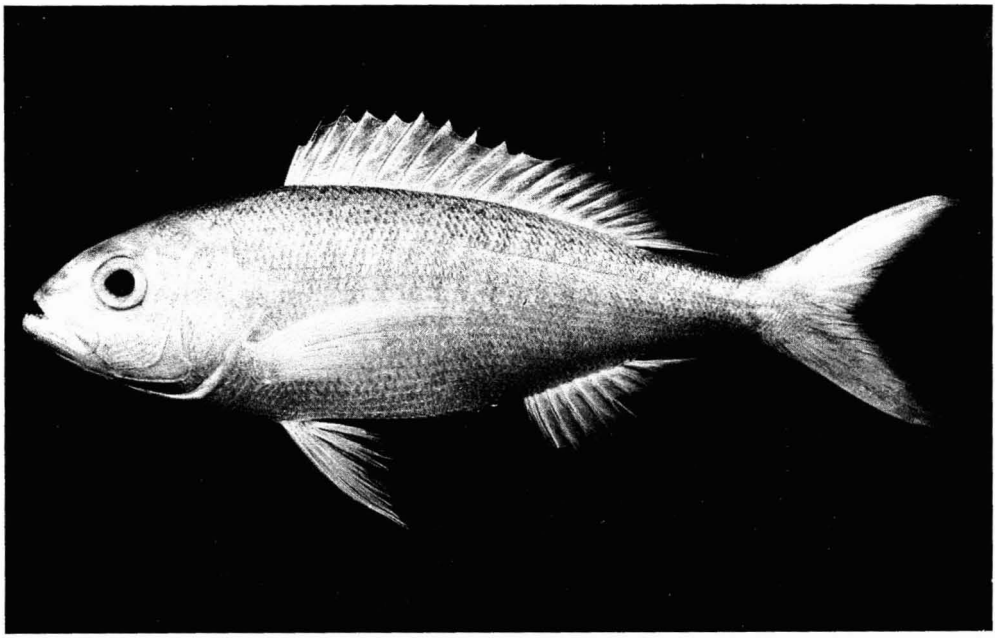

FIGURE 5. *Pristipomoides auricilla*, 327 mm SL, 0.8 kg, BPBM 22420.

LUTJANIDAE (SNAPPERS)

Pristipomoides auricilla

Figure 5

Arnillo auricilla Jordan, Evermann, and Tanaka, 1927. Proc. Ca. Acad. Sci., ser. 4, vol. 16, p. 668, pl. 23, fig. 3 (type locality, Honolulu).

Gosline and Brock (1960) placed *Arnillo auricilla* in the synonymy of *Pristipomoides sieboldii* (Bleeker), but with a question mark; and Tinker (1978) overlooked it in his compilation of Hawaiian fishes.

Jordan, Evermann, and Tanaka (1927) described four new genera and eight new species of fishes from the Hawaiian Islands. None of the new genera are recognized today, and of the new species, only *Pristipomoides auricilla* appears valid. [William F. Smith-Vaniz (personal communication) rendered an opinion on the invalidity of the five new carangid fishes of Jordan, Evermann, and Tanaka.]

The original description of *Pristipomoides auricilla*, which included notes on the color in life, was sufficiently detailed so that no redescription is necessary. Of diagnostic importance are: the occurrence of villiform teeth on the vomer in a triangular patch, the posterior border of which is broadly rounded; lack of teeth on the tongue; 70–74 lateral-line scales; 18–21 lower-limb gill rakers; and bright yellow over most of the upper lobe of the caudal fin (dorsal margin of fin bluish gray).

Pristipomoides auricilla is not confined to the Hawaiian Islands. Abe (1960) recorded it from the Bonin Islands and Japan. Kami, Ikehara, and DeLeon (1968) included it in their checklist of the fishes of Guam (their specimens are deposited in the Bishop Museum under BPBM 5565). Masuda, Araga, and Yoshino (1975: pl. 61B) illustrated the species in color from the Ryukyu Islands. Fourmanoir and Laboute (1976: 82) reported it from New Caledonia and also provided a figure in color.

Kami (1973), in a review of the genus *Pristipomoides* of Guam, reported that *P. auricilla* is the most common species there. It is taken in 90–360 m, but most often in

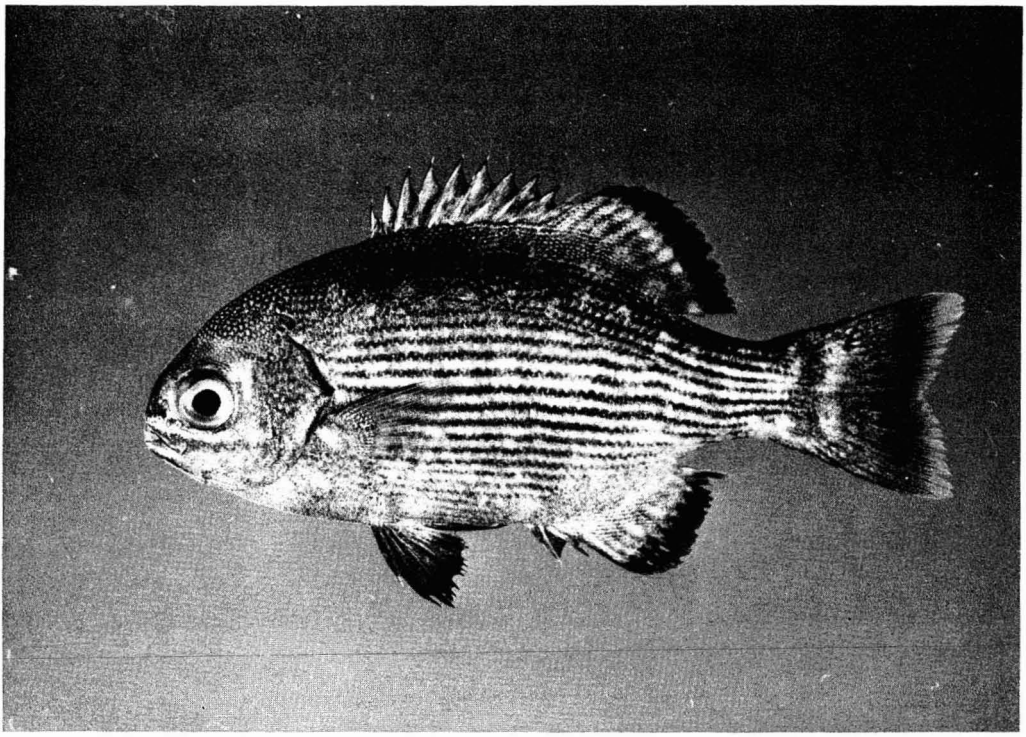

FIGURE 6. *Kyphosus cinerascens*, 57 mm SL, BPBM 22478.

181–270 m. The largest of 778 Guam specimens examined by Kami measured 410 mm FL.

KYPHOSIDAE (CHUBS)

Kyphosus cinerascens

Figure 6

Sciaena cinerascens Forsskål, 1775. Descr. Animal., p. 53 (type locality, Red Sea).

Gosline and Brock (1960) and Tinker (1978) listed only one species of *Kyphosus* from Hawaii, *K. cinerascens* (Forsskål). However, there are three species of this genus in the islands. One appears to be *K. cinerascens*, but it is represented only by a single juvenile specimen (BPBM 22478, 57 mm SL) caught in a floating container off Koko Head, Oahu, by A. B. Tarr of the Bernice P. Bishop Museum on 2 October 1978. The species recorded as *K. cinerascens* by Gosline and Brock and by Tinker seems to be *K. bigibbus* Lacepède.

The most diagnostic feature of *Kyphosus cinerascens* is the elevated soft portion of the dorsal fin; it is distinctly higher than the spinous portion. The longest dorsal spine of the juvenile here identified as *cinerascens* is contained 1.3 times in the length of the longest dorsal ray. Other characteristics suggestive of *cinerascens* are 12 dorsal soft rays, 11 anal soft rays, about 52 lateral-line scales, 9 + 19 gill rakers, relatively deep body (depth 2.2 in SL), and maxilla extending beyond a vertical at anterior edge of orbit (closer to front of pupil than front of orbit). Only the number of pectoral rays (17) seems atypical; *cinerascens* is recorded to have 18 or 19, and the four available Bishop Museum specimens have either 18 or 19. Positive identification of this juvenile as *K. cinerascens* should await the collection of further specimens (preferably adults).

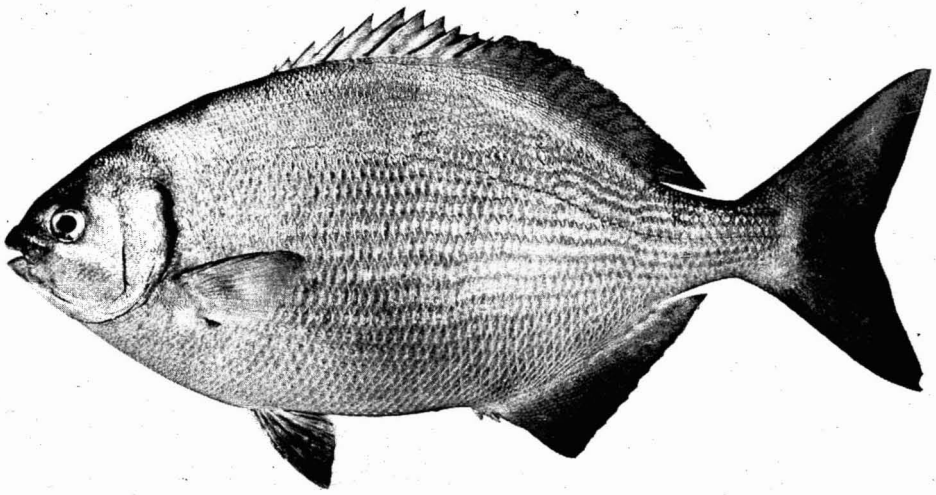

FIGURE 7. *Kyphosus vaigiensis*, 372 mm SL, 2.25 kg, BPBM 12165.

Kyphosus vaigiensis

Figure 7

Pimelepterus vaigiensis Quoy and Gaimard, 1824. Voyage autour de monde ... *L'Uranie* ... p. 386, pl. 62, fig. 4 (type locality îles des Papous and Bony).

On 13 January 1972, the author was surprised to find several large locally caught specimens of *Kyphosus vaigiensis* in a Honolulu fish market. One was purchased (BPBM 12165, 372 mm SL) for deposit in the Bernice P. Bishop Museum. Although superficially resembling *K. bigibbus*, this species is distinctive in having 14 dorsal soft rays and 13 anal soft rays. Other diagnostic data from the specimen are as follows: spinous portion of dorsal fin higher than soft portion; pectoral rays 19, lateral-line scales 54, gill rakers 11 + 24, depth of body 2.25 in SL, and maxilla not reaching a vertical at front edge of orbit. When fresh, the specimens were silvery gray with longitudinal bands of yellowish brown on side of body; a diagonal orangish streak on upper lip continuing onto cheek nearly to corner of preopercle; another less distinct streak above and nearly parallel to the first, passing through eye; a faint orangish blotch above pectoral base; opercular membrane blackish except region at level of eye which is dark orangish; soft portions of dorsal and anal fins, pelvic fins, and to a lesser extent caudal fin dark brownish gray (darker than body), the caudal faintly suffused with yellowish; pectoral fins light brownish gray, the upper edge blackish.

MULLIDAE (GOATFISHES)

Upeneus vittatus

Figure 8

Mullus vittatus Forsskål, 1775. Descr. Animal., p. 31 (type locality, Jeddah, Red Sea).

On 26 January 1976, the author discovered a specimen of the goatfish *Upeneus vittatus* at the Tamashiro Market in Honolulu. An inquiry on the source of the specimen revealed that it had been caught in Kaneohe Bay, Oahu. The specimen (BPBM 19909, 201 mm SL) was donated to the Bernice P. Bishop Museum by the market. It represents the first record of the species for the Hawaiian Islands.

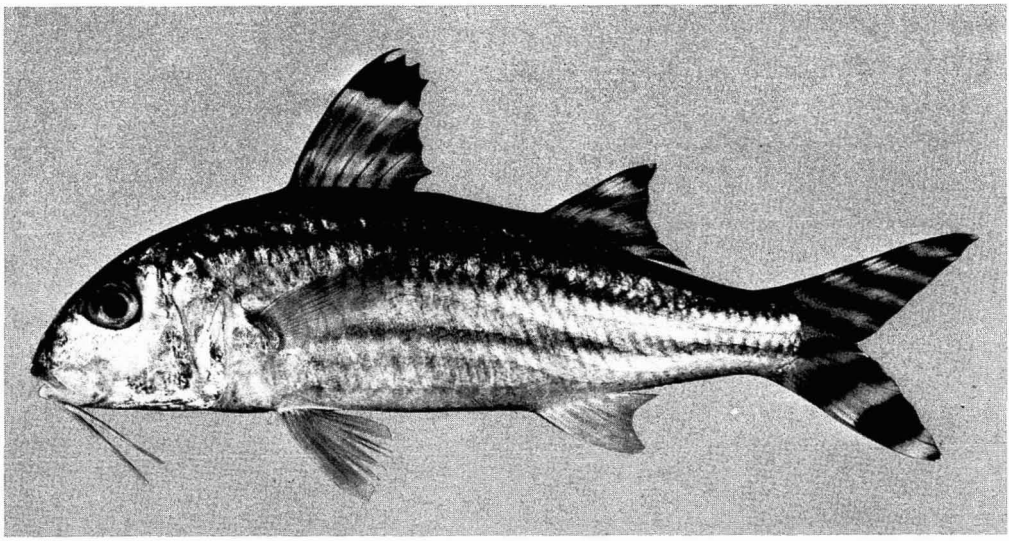

FIGURE 8. *Upeneus vittatus*, 201 mm SL, BPBM 19909.

In all probability, this species became established as a result of a careless introduction from Nuku Hiva, Marquesas Islands, by the Division of Fish and Game of the State of Hawaii in 1955. The intended species for introduction was the Marquesan sardine, *Sardinella marquesensis*. In the same baitwell with the sardines, however, were three jacks of the genus *Caranx*: a bonefish (*Albula*), a mullet (*Chelon engeli*), and *Upeneus vittatus*. Instead of eliminating the other species from the baitwell of sardines, all were dumped into the sea off Oahu. As pointed out by Randall and Kanayama (1972), it is likely that *Chelon engeli* became established in Hawaii from the same introduction. It is a small species of mullet of little or no commercial value that seems to have increased in abundance at the expense of the commercially important mullet *Mugil cephalus*. As yet, *U. vittatus* seems to have caused no obvious disturbance of the Hawaiian ecosystem.

Hawaii has one other representative of the genus *Upeneus*, *U. arge* Jordan and Evermann.[3] Like *U. arge*, *vittatus* exhibits yellow stripes on the body and transverse dark bands on the dorsal fins and caudal lobes. It is readily distinguished by having fewer dark bands on the caudal lobes (three on the lower lobe of adults, compared to four or five for *U. arge*), a broad jet-black band near the tip of the first dorsal fin (narrow and blackish on *arge*), 26–31 gill rakers (21–24 for *arge*), 33–37 transverse rows of scales on body (compared to 36–38 for *arge*), and shorter barbels (46–66 percent head length compared to 64–74 percent for *arge*). Meristic and barbel length data are from Lachner (1954). The Bishop Museum specimen has 8 + 20 gill rakers, 37 scale rows, and a barbel length 60 percent of head length.

On 11 November 1977, Hiroshi Kato collected a second Hawaiian specimen of *Upeneus vittatus* 227 mm SL at a depth of 7 m with a gill net in Kaneohe Bay. It is deposited in the reference fish collection, Windward Community College, Oahu.

[3] Paul Guézé (personal communication) has informed the author that *Upeneus taeniopterus* Cuvier is an older name for *U. arge*.

LABRIDAE (WRASSES)

Thalassoma quinquevittatum

Scarus quinquevittatus Lay and Bennett, 1839. Zool. Beechey's voyage, p. 66, pl. 19, fig. 3 (type locality, Ryukyu Islands).

Gosline and Brock (1960) included an account of *Thalassoma quinquevittatum* in their

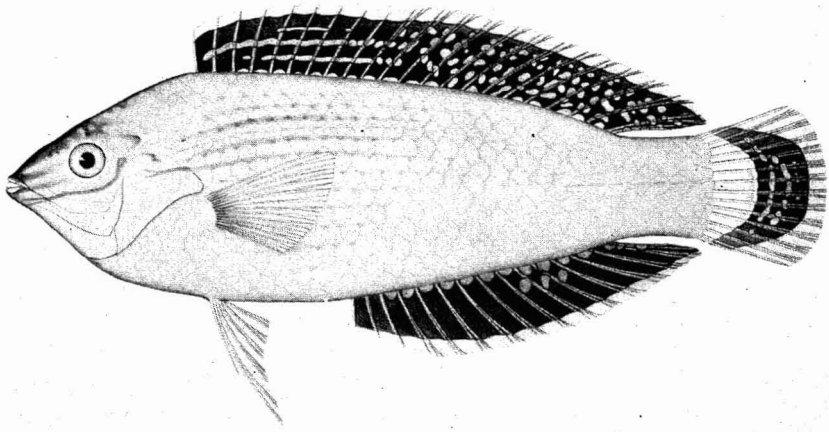

FIGURE 9. *Halichoeres marginatus*, 82 mm SL, BPBM 9282.

Handbook of Hawaiian Fishes, but they stated that the species is not known north of Johnston Island. However, they overlooked the record of one specimen from French Frigate Shoals reported by Fowler and Ball (1925) as *Thalassoma guntheri* (Bleeker). Fowler (1928) also listed this species, correcting the name to *T. quinquevittatum*.

Edmund S. Hobson (personal communication, 1970) informed the author that he had discovered a second terminal male color form of *Thalassoma duperrey* on the Kona coast of the island of Hawaii, which he observed spawning with typical female *T. duperrey*. When doubt was expressed that there could be two different terminal male color phases of *duperrey*, Hobson sent an underwater photograph of the fish in question. It proved to be *T. quinquevittatum*. Later the author dived with Hobson and also observed this fish in Kona, where it is rare. Evidently, interspecific spawning occurs as a result of the inability of terminal male *T. quinquevittatum* to find females of its species at spawning time. The hybrids *T. quinquevittatum* × *T. duperrey* were seen at Kona. A comparable situation obtains with the surgeonfishes *Acanthurus glaucopareius* and *A. achilles*. The former is rare at Kona and the latter is abundant; hybrids of the two (Randall 1956) may occasionally be seen.

Halichoeres marginatus

Figure 9

Halichoeres marginatus Rüppell, 1835. Neue Wirbelth., ... Fische rothen Meeres, p. 16 (type locality, Red Sea).

On 30 March 1962, a single male specimen of the labrid fish *Halichoeres marginatus* (BPBM 9282, 82 mm SL) was taken with rotenone in a large pool at Kapoho on the island of Hawaii by Michael Fitzsimmons. The pool, which was formed during the 1960 lava flow, is about an acre in area and 5–10 m deep. Several years later, Paul Allen revisited the pool searching for additional individuals of this wrasse but observed none.

Halichoeres marginatus is a wide-ranging species, occurring from the Red Sea and East Africa to French Polynesia. It is usually common at most localities where it is found. Since only one specimen has been obtained and no others sighted, it seems likely that this individual is a waif drifting in from some distant locality and not a representative of a breeding population in Hawaii. There is little chance that it is an aquarium release, since this species is not a popular aquarium fish, the locality is distant from population centers, and few non-Hawaiian fishes were available in the aquarium trade in 1962.

The meristic data for the specimen are as

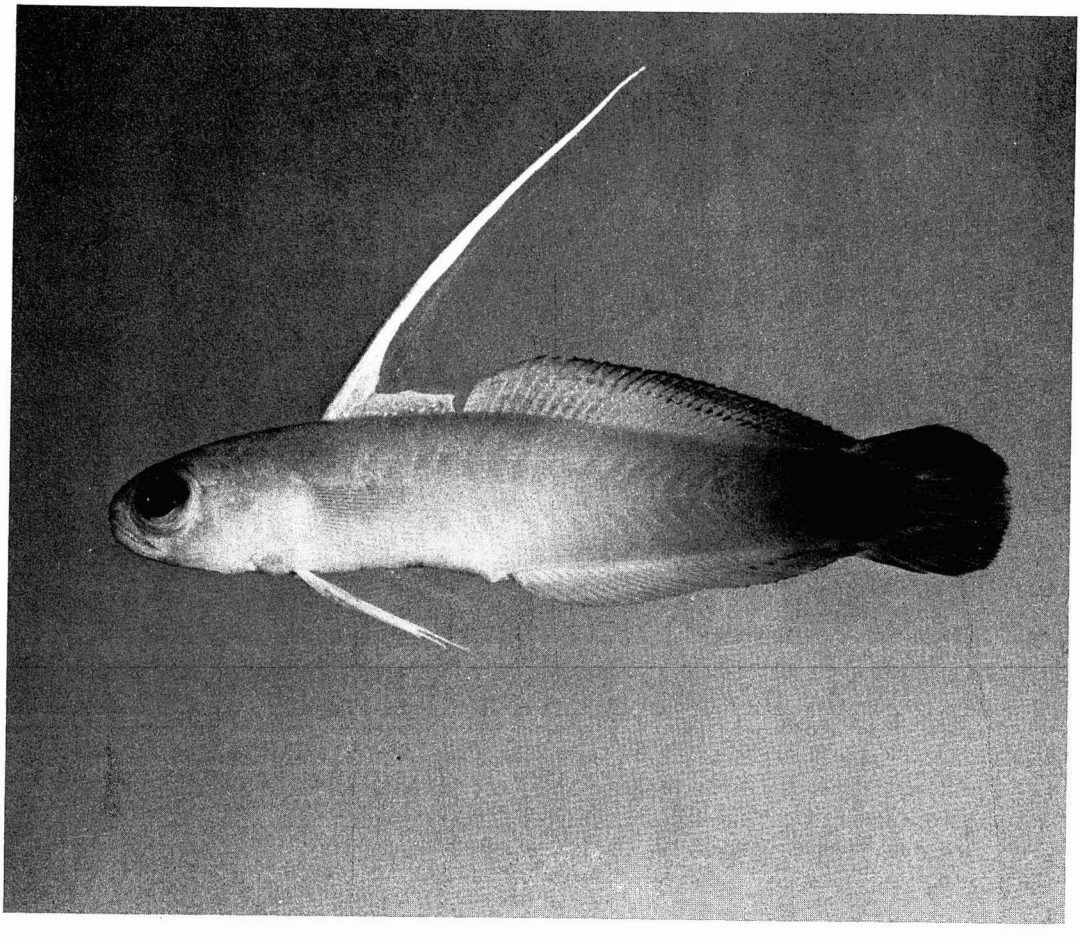

FIGURE 10. *Nemateleotris magnifica*, 30.5 mm SL, BPBM 22483.

follows: dorsal rays IX,13; anal rays III,12; pectoral rays 14; lateral-line scales 29; gill rakers 20.

GOBIIDAE (GOBIES)

Nemateleotris magnifica

Figure 10

Nemateleotris magnificus Fowler, 1938. Proc. U.S. Nat. Mus., vol. 85, p. 132 (type locality, Buka Buka Island, Celebes).

The distinctive gobiid genus *Nemateleotris* is represented by three species (Randall and Allen 1973). The most wide-ranging is *N. magnifica*, which occurs from East Africa to French Polynesia and the Pitcairn Group. Although recorded from Johnston Island, it was unknown in the Hawaiian Islands until recently. In the 1970s, there were several reports of sightings in Hawaii by divers familiar with this colorful fish. One was Anthony Nahacky, who tried to catch a tiny juvenile off Makaha, Oahu, which he estimated at $\frac{1}{2}$ inch in total length, but it passed through the mesh of his net. He later returned to the same site, but the little fish was gone. Finally, in early September 1978, Glenn T. Fukuda captured one individual off Keaau Beach Park, Waianae, Oahu, at a depth of 18 m. He maintained it alive in an

aquarium until 17 November at which time he donated it to the Bernice P. Bishop Museum. This specimen, BPBM 22483, 30.5 mm SL, is typical of the species. Meristic data are as follows: dorsal rays VI-I,29; anal rays I,29; pectoral rays 19; gill rakers 5 + 17. In life this goby is beautifully colored; it is white anteriorly on the body gradually shading in about the middle to orange-red and thence to blackish on caudal peduncle and fin; two bands of deep olive edged with orange-red converge as they pass posteriorly on caudal fin; approximately the anterior half of head yellow, the posterior half white with small lavender spots that continue as a broad band on side of nape and along back beneath base of first dorsal fin (spots progressively smaller posteriorly); a mid-dorsal band of lavender on nape; first dorsal fin white with pale-blue dots basally, an anterior margin of red and narrow submarginal light-blue band; second dorsal fin yellowish white anteriorly with pale blue dots, shading to orange-red posteriorly, the outer part blackish except a faint narrow submarginal band of red; a narrow longitudinal dark-olive band, sometimes as a series of spots, in about middle of fin, better developed posteriorly; anal fin similar to dorsal but lacking the blue-spotted whitish anterior part; the broad blackish margin and olive band are restricted to posterior part of fin; pectoral fins hyaline; pelvic fins yellowish white.

Discordipinna griessingeri

Discordipinna griessingeri Hoese and Fourmanoir, 1978. Japan. J. Ichth., vol. 25, p. 21, figs. 1–4 (type locality, El Himeira, Gulf of Aqaba, Red Sea).

This tiny goby was recently described as a new genus and species from 15 specimens taken at the following diverse localities: Red Sea, St. Brandon's Shoals, Cocos-Keeling Island, Great Barrier Reef, Fiji, Tahiti, and the Marquesas. The largest specimen (one collected by the author in Tahiti in 1967) measures only 21 mm SL. The paucity of specimens, despite the broad distribution of this species, may be related to its small size. Nevertheless, it is obviously not an abundant goby.

The Hawaiian record reported herein (BPBM 22477) is based on a single individual 16 mm SL collected by W. A. Gosline and associates in 3 m off Kahe Point, Oahu, on 9 March 1968 just as it was emerging from the base of a head of *Porites*. William P. Davis intended to report on the specimen, and he held it on loan from the University of Hawaii for some years. After the description of the species by Hoese and Fourmanoir, he sent the fish for deposit in the Bernice P. Bishop Museum so that it could be included in this paper.

The most distinctive external features of this species are its elongate first dorsal fin of V spines, which originates over the posterior part of the head and is widely separated from the second dorsal fin, depressed head, wide gill opening, large pectoral fins with exserted rays, pointed caudal fin as long or longer than head, fully scaled body (ctenoid scales posteriorly, cycloid anteriorly), large but relatively few head papillae, and striking color pattern. The lower third to half of the body is abruptly dusky to dark brown; the head is pale with blackish spots; the second dorsal fin and upper part of the caudal fin have large ocellated blackish spots. No notes were taken on the color in life of the Hawaiian specimen. A 19-mm Tahitian specimen was colored when fresh as follows: upper part of body white, lower part brownish red; head white with dark reddish-brown spots; fins dominated by orange-red, the second dorsal and upper part of caudal with three large blackish spots; the two dorsal fins and the caudal fin have very narrow, sometimes incomplete white margins; the second dorsal and caudal fins have a blackish submarginal zone; a blackish band containing white dots in lower third of second dorsal fin; a pale-yellow streak in caudal fin from upper and middle base to about center of fin; a diagonal yellowish streak on pectoral fins.

The counts of the Hawaiian specimen are: dorsal rays V-I,8; anal rays I,8; pectoral rays 18; branched caudal rays 15; scale rows about 25 (some missing so count difficult to make); lower-limb gill rakers 8 (upper limb with only one developed raker).

POMACANTHIDAE (ANGELFISHES)

Centropyge multicolor

Centropyge multicolor Randall and Wass, 1974. Japan. J. Ichth., vol. 21, p. 138, fig. 1 (type locality, Enewetak, Marshall Islands).

This small angelfish was described from specimens taken in the Marshall and Society Islands. Usually, it is found at depths of 20 m or more on exposed outer reefs.

Centropyge multicolor may be diagnosed as follows: a prominent spine at corner of preopercle; a single spine (rarely two) on lower margin of preopercle; preorbital with 4–6 small spines; dorsal rays XIV,16 or 17 (usually 16); anal rays III,17; pectoral rays 16–19; gill rakers 6 or 7 + 16; depth of body 1.9–2.0 in SL, caudal fin rounded; first 5 or 6 interspinous membranes of dorsal fin incised one-fourth or more length of spines; cirrus at upper end of each interspinous membrane of dorsal fin small. In life the color is white dorsally on body, becoming yellow on caudal peduncle and fin; snout, lower head, thorax, and anterior abdomen yellow; rest of abdomen and ventral part of body posterior to abdomen orangish brown; upper postorbital head black with narrow blue bars.

The Hawaiian record (BPBM 21059, 83 mm SL) is based on one specimen collected by Brian Ikeda on the Kona coast of the island of Hawaii off the point just south of Honakau in 46 m. He maintained it in an aquarium until December 1977, when it died. He then donated it to the Bernice P. Bishop Museum. The specimen has XIV,16 dorsal rays; III,17 anal rays; 18 pectoral rays; and 7 + 16 gill rakers.

ACANTHURIDAE (SURGEONFISHES)

Acanthurus lineatus

Chaetodon lineatus Linnaeus, 1758. Systema Naturae, ed. 10, vol. 1, p. 274 (type locality, Indies).

On 9 April 1972, Nelson Santos of the Division of Fish and Game of the State of Hawaii cast a throw net from a rocky shore at Manuku on the Kona coast of Hawaii about 5 mi north of South Point. Among the fishes he caught was an adult of *Acanthurus lineatus* (BPBM 15543, 205 mm SL). Not recognizing this surgeonfish as one reported from the Hawaiian Islands, he froze the specimen and passed it on to the Bernice P. Bishop Museum. It represents the first record for Hawaii.

Acanthurus lineatus is a common species throughout the Indo-Pacific (except the Red Sea, Pitcairn Group, and Easter Island). It occurs inshore on coral reefs and rocky substrata exposed to wave action where it feeds on benthic algae. It is territorial and highly aggressive; the caudal spine is venomous (Randall 1959).

It is unlikely that this fish represents an aquarium release, because *Acanthurus lineatus* is not a popular aquarium fish and the area of capture is distant from any population center on the island of Hawaii (which is relatively sparsely populated).

This surgeonfish is among the most colorful of species of *Acanthurus*; it has alternating yellow and black-edged blue stripes on the upper three-fourths of the body, the lower fourth lavender to bluish white. Along with the related *A. sohal* (Forsskål) of the Red Sea, it has the largest caudal spine of the genus (1.9–2.0 in head length). It is somewhat elongate for an *Acanthurus*, the depth of adults up to 3.0 in SL. The caudal fin is very lunate, the caudal concavity 3.3–4.5 in SL.

The Hawaiian specimen is typical of the species, except the caudal spine is a little small for a fish of this size (2.5 in head). Meristic data of the specimen are as follows: dorsal rays IX,28; anal rays III,27; pectoral rays 16; anterior gill rakers 16.

TRICHIURIDAE (CUTLASSFISHES)

Assurger anzac

Figures 11 and 12

Evoxymetopon anzac Alexander, 1916. J. R. Soc. W. Austral., vol. 2, p. 104, pl. 7 (type locality, Fremantle, Western Australia).

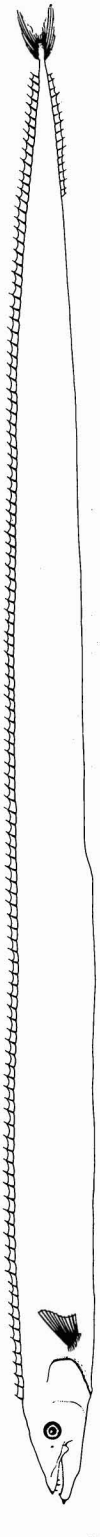

FIGURE 11. *Assurger anzac*, 2317 mm SL, 4.1 kg, BPBM 19910.

The first specimen of this species, 1415 mm in total length, washed ashore at Fremantle, Western Australia. It was deposited in the Western Australian Museum. Whitley (1933) proposed the new genus *Assurger* for this fish. In his preliminary revision of the Trichiuridae, Tucker (1956) recognized *Assurger* as a valid genus and grouped it in the Lepidoponinae.

Kamohara (1952) reported a specimen 2250 mm in length obtained from the market at Kochi, Shikoku, Japan. He provided a sketch of it but no description. Parin and Becker (1972) recorded a 323-mm specimen taken from the stomach of *Alepisaurus* from off western Australia (20°S, 106°42′E) and a 24-mm specimen from off New Guinea (0°30′N, 135°9′E).

On 2 February 1976, a specimen caught on a tuna longline at an estimated depth of 125–200 m off the island of Hawaii was landed at Hilo from the vessel *Lady Lyn*, skippered by Edward Paulo. Nelson Santos of the Division of Fish and Game, State of Hawaii, realized it was a unique fish and obtained it for the Bernice P. Bishop Museum. When fresh it measured 2418 mm in total length (now 2370 mm in preservative, the standard length 2317 mm), but weighed only 4.1 kg. This fish (BPBM 19910) has a surprisingly elongate body, the maximum depth only 110 mm, but is even more remarkable for its thin body, the greatest width being only a scant 25 mm.

On 25 September 1977, a second specimen was taken 400 mi south of Honolulu by a longline set in 180 m. The depth of the water at this point was 11,400 ft. The longline vessel was the *Mokihana*, and the captain was David Nabeshima. The specimen was given to Leighton Taylor, Director of the Waikiki Aquarium, who donated it to the Bernice P. Bishop Museum. It is now BPBM 21104 and measures 2218 mm total length.

Because descriptive data on this species are limited, the following information is offered, based on the two Hawaiian specimens. Various measurements in millimeters are given in Table 1. Dorsal rays 118–120 (spinous portion not distinct); anal fin with a very small first spine and scalelike second spine;

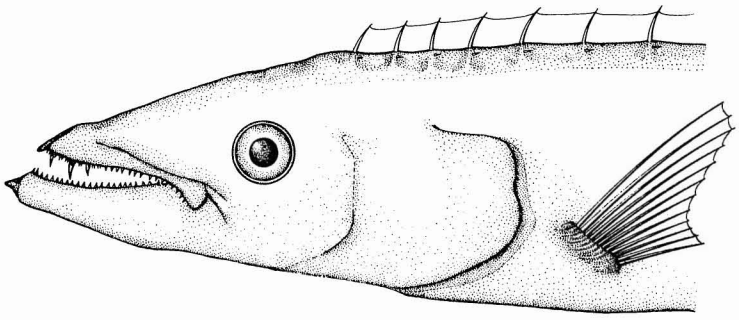

FIGURE 12. Head of *Assurger anzac*, same specimen as Figure 11.

TABLE 1

MEASUREMENTS (IN MILLIMETERS) OF TWO HAWAIIAN SPECIMENS OF *Assurger anzac*

Total length	2,370.0	2,218.0
Standard length	2,317.0	2,165.0
Depth of body	110.0	107.0
Width of body	25.0	25.3
Head length	201.0	193.5
Snout length	78.4	76.5
Orbit diameter	26.4	24.2
Interorbital width	21.1	20.8
Length of upper jaw	65.2	64.3
Least depth of caudal peduncle	5.8	4.7
Predorsal length	133.0	131.0
Prepelvic length	284.0	267.0
Snout to anus	953.0	902.0
Length of first dorsal ray	13.5	Broken
Length of longest dorsal ray	30.5	34.0
Length of longest anal ray	18.3	19.0
Length of caudal fin	42.0	43.0
Caudal concavity	25.3	28.0
Length of pectoral fin	83.8	79.2
Length of pelvic fin	14.8	14.1

anal rays mostly embedded, only the last 13–16 free and supporting membranes; pectoral rays 12, the upper two and lowermost unbranched; head and body scaleless; gill rakers numerous, close-set, sessile, only 2 or 3 on upper limb and 6–9 on lower with a spinous projection above base; vertebrae 125 (42 to anus) (from dissection of smallest specimen).

Body very elongate and tapering, the maximum depth 20.3–21.0 in SL, and extremely compressed, the width 4.2–4.4 in depth. Dorsal profile of snout rather straight, becoming convex on nape; median dorsal edge of head a sharp ridge; tip of upper and lower jaws with a fleshy pointed projection; snout 2.5–2.55 in head; eye near center of head, the orbit diameter 7.6–8.0 in head; bony interorbital width 9.3–9.5 in head; caudal peduncle very slender, the least depth 35–41 in head.

Mouth horizontal, the lower jaw strongly projecting (11 mm anterior to upper jaw on larger specimen); maxilla reaching a vertical at nostril, its upper posterior part slipping under membranous preorbital margin when mouth is closed. About 35 sharp compressed teeth along margin on each side of upper jaw and about 26 in lower (anterior two enlarged); a series of three huge fangs, sharp on anterior and posterior edges, in an inner row on each side at front of upper jaw (the middle the longest, 9.3 mm on largest specimen); very small teeth in a single row on palatines.

A single large (5-mm) subspherical nasal opening directly in front of center of eye.

Origin of dorsal fin about two-thirds orbit diameter behind eye; first dorsal ray not elongate, its length nearly 15 in head; eleventh or twelfth dorsal ray from the last the longest, 5.7–6.6 in head; longest anal ray (about eighth from last) 10.2–11 in head; caudal fin very small, 4.5–4.8 in head, and forked; pectoral fins on lower third of body, the lower two rays longest, 2.4–2.45 in head; pelvic rays very small, scalelike, 13.5–13.7 in head.

FIGURE 13. *Hyperoglyphe japonicc*, 588 mm SL, 4.5 kg, BPBM 20465.

The specimens were silvery when fresh. In preservative they are pale brown; there is a speckling of tiny dark pigment spots along the edge of the gill opening and an extension of this as a faint expanding band to base of dorsal fin, some pigment extending anterior and posterior to the band along dorsal base; median line of forehead and snout and the tips of the jaws blackish; a small blackish area at dorso-posterior edge of nostril.

Both specimens are females with well-developed ovaries. The ovaries of the largest specimen are 480 mm long, each 14 mm in diameter, and joined together medially over their entire length.

CENTROLOPHIDAE (DRIFTFISHES)

Hyperoglyphe japonica

Figure 13

Centrolophus japonicus Döderlein in Steindachner and Döderlein, 1885, Denks. Akad. Wiss. Wien, vol. 49, p. 183 (type locality, Tokyo).

On 29 October 1976, while handlining from the R/V *Townsend Cromwell* in 256–274 m at Hancock Seamount, Leeward Hawaiian Islands (29°45′N, 179°04′E), personnel of the Honolulu Laboratory of the National Marine Fisheries Service caught a large centrolophid fish that had not been noted before from Hawaiian waters. The fish (BPBM 20465, 588 mm SL, 734 mm TL) was donated to the Bernice P. Bishop Museum by Thomas S. Hida. It proved to be the first record of *Hyperoglyphe japonica* for Hawaii. There is a small deep handline fishery for this species in Japan (Haedrich 1967).

The following meristic and measurement data were obtained from the specimen: dorsal rays VII,23; anal rays III,18; pectoral rays 21; lateral-line scales 97; gill rakers 7 + 16. Depth of body 3.2 in SL; width of body 2.05 in depth; head length 3.7 in SL; snout obtusely rounded, its length 3.5 in head; mouth terminal, oblique, the maxilla reaching a vertical at front edge of pupil; teeth in jaws small, in a narrow band; eye large, about equidistant between dorsal and ventral profiles, the orbit diameter 4.35 in head; interorbital highly convex, the bony width 2.9 in head; least depth of caudal

peduncle 3.15 in head; first and second dorsal rays longest, 2.4 in head; pectoral fins long and pointed, their length 3.9 in SL; pelvic fins 2.6 in head; caudal fin forked, 4.3 in SL.

The color is brown on head and back, shading to pale on sides and ventrally, with faint longitudinal dark lines following centers of scale rows on side of body.

ADDENDUM

PENTACEROTIDAE (ARMORHEADS)

Pentaceros richardsoni

Pentaceros richardsoni A. Smith, 1849. Illustr. Zool. S. Africa, vol. 4 (Pisces), pl. 21 (type locality, Cape of Good Hope).

The recent acquisition by the Bishop Museum of large collections of fishes from the Honolulu Laboratory of the National Marine Fisheries Service (NMFS) has resulted in the first specimens of the armorhead *Pentaceros richardsoni* Smith from the Hawaiian area. The first lot (BPBM 20684, 2:240–243 mm SL) was taken at the Hancock Seamount (29°46′N, 179°03′E) at about 370 m by the Russian trawler *Ekvator* in March and April 1977 and was preserved by Thomas S. Hida of the NMFS. The second lot (BPBM 26410, 3:240–258 mm SL) was also obtained by trawling at the Hancock Seamount, this time by the *Townsend Cromwell* in about 270 m in April 1980; the specimens were obtained for the Bishop Museum by Gordon W. Tribble of NMFS. Hida has informed the author of two larger specimens taken from the *Townsend Cromwell* in the Leeward Hawaiian Islands by handlining while drifting. A male 498 mm in total length weighing 2.0 kg was caught on 15 June 1980 at Ladd Bank (28°36′N, 176°43′W) at a depth of 150–310 m, and a female 435 mm SL, 495 mm total length, weighing 2.8 kg, was caught on 24 June 1980 at Kure (28°30.82′N, 178°20.86′W) at a depth of 180–270 m. These two specimens have not yet been made available to the Bishop Museum.

The Museum also has two lots of juveniles collected by the National Marine Fisheries Service south of the Aleutian Islands (BPBM 25156, 2:109–115 mm SL, taken by gill net at 45°41′N, 165°05′W on 27 September 1955, and BPBM 25737, 2:66–94 mm SL, collected at a night light at the surface at 44°39′N, 174°48′W on 14 August 1958). These fish have the typical juvenile pattern of a broad dark brown reticulum, in contrast to adults which are uniform brownish gray.

The five Hawaiian specimens now in the Bishop Museum have the following meristic and measurement data: dorsal rays XIV,8 or 9; anal rays IV,7 or 8; pectoral rays 17 or 18; lateral-line scales 70–75 (to base of caudal fin); gill rakers 7 or 8 + 17–19; depth of body 2.7–3.0 in SL, head length 2.82–2.94 in SL; orbit diameter 3.8–4.1 in head; longest dorsal spine (third or fourth) 1.87–2.2 in head; pectoral fins 1.06–1.2 in head; pelvic spine 1.6–1.93 in head (the longest pelvic ray slightly longer, 1.57–1.7 in head); caudal fin emarginate, 1.55–1.72 in head.

J. L. B. Smith (1964) reviewed the family Pentacerotidae (Ichth. Bull. Rhodes Univ., no. 29). He showed that *P. richardsoni* has an antitropical distribution: Cape of Good Hope, Cape Horn, and New Zealand in the Southern Hemisphere and Japan and the northeast Pacific from California to Alaska in the Northern Hemisphere. The Hawaiian records herein represent the lowest latitude from which this species has been taken.

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Gordon W. Tribble. The drawing of Figure 9 was made by Janet Gomon of the U.S. National Museum of Natural History and Figures 11 and 12 by Eddie O. Rosell of the Bernice P. Bishop Museum.

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